IN THE CLAIMS

Please amend the claims as follows:

Claims 1-15 (Canceled)

Claim 16 (Currently Amended): ~~The estimation method according to Claim 15,~~

A method of estimating a channel and a direction of arrival (θ) of a signal received by an array of antennae after being propagated along at least one path, comprising, for each path:

a first step of estimating for each antenna (l) in the array of antennae a total phase difference (ξ_l) from a signal (x_l) received by each antenna (l);

a second step of estimating the angle of arrival (θ) of the signal, as well as a phase rotation (ν) undergone by the signal along the at least one path, using each of the antennae total phase differences determined in the first step; and

a third step of estimating an attenuation (α) undergone by the signal along the at least one path from estimated values $(\hat{\nu}, \hat{\theta})$ of the phase rotation (ν) and the angle of arrival (θ),

wherein the first step comprises, for each signal received (x_l), minimizing a distance between a plurality of values of the received signal (x_l) taken at a plurality of times (t) and values of a pilot signal (b) taken at said plurality of times (t).

Claim 17 (Previously Presented): The estimation method according to Claim 16, wherein the first step comprises estimating the total phase difference ξ_l of the signal x_l received by the antenna l by the following equations:

$$\hat{\xi}_l = Arc\tan\left(\frac{S_l^1 - S_l^2}{S_l^3 + S_l^4}\right) \text{ where}$$

$$S_l^1 \stackrel{\Delta}{=} \sum_{t=1}^{T} x_l^1(t).b_R(t),$$

$$S_l^2 \stackrel{\Delta}{=} \sum_{t=1}^{T} x_l^R(t).b_I(t),$$

$$S_l^3 \stackrel{\Delta}{=} \sum_{t=1}^{T} x_l^R(t).b_R(t), \text{ and}$$

$$S_l^4 \stackrel{\Delta}{=} \sum_{t=1}^{T} x_l^1(t).b_I(t)$$

where $x_l^R(t)$ and $x_l^1(t)$ are respectively a real part and an imaginary part of a value of the signal x_l received in antennae *l* at *t*, $b_R(t)$ and $b_I(t)$ are real and imaginary parts of a value of the pilot signal *b* at the time *t*, and *T* is a time window length.

Claim 18 (Currently Amended): ~~The estimation method according to Claim 15,~~

A method of estimating a channel and a direction of arrival (θ) of a signal received by an array of antennae after being propagated along at least one path, comprising, for each path:

a first step of estimating for each antenna (l) in the array of antennae a total phase difference (ξ_l) from a signal (x_l) received by each antenna (l);

a second step of estimating the angle of arrival (θ) of the signal, as well as a phase rotation (ν) undergone by the signal along the at least one path, using each of the antennae total phase differences determined in the first step; and

a third step of estimating an attenuation (α) undergone by the signal along the at least one path from estimated values $(\hat{\nu},\hat{\theta})$ of the phase rotation (ν) and the angle of arrival (θ),

wherein the second step comprises removing an ambiguity in the total phase difference values sequentially from one antenna to another antenna starting from a reference antenna of the array.

Claim 19 (Previously Presented): The estimation method according to Claim 18, wherein the step of removing of an ambiguity comprises using an affine relationship between the total phase difference and a rank of a respective antenna in the array.

Claim 20 (Currently Amended): ~~The estimation method according to Claim 15~~

A method of estimating a channel and a direction of arrival (θ) of a signal received by an array of antennae after being propagated along at least one path, comprising, for each path:

a first step of estimating for each antenna (l) in the array of antennae a total phase difference (ξ_l) from a signal (x_l) received by each antenna (l);

a second step of estimating the angle of arrival (θ) of the signal, as well as a phase rotation (ν) undergone by the signal along the at least one path, using each of the antennae total phase differences determined in the first step; and

a third step of estimating an attenuation (α) undergone by the signal along the at least one path from estimated values ($\hat{\nu},\hat{\theta}$) of the phase rotation (ν) and the angle of arrival (θ),

wherein the second step comprises estimating the phase rotation (ν) and the angle of arrival (θ) from a linear regression of estimated values of the total phase differences.

Claim 21 (Previously Presented): The estimation method according to Claim 20, wherein said second step comprises estimating the phase rotation (ν) and the angle of arrival (θ) by minimizing a distance $J(\nu,\varphi)=\sum_{l=1}^{L}(\nu+(l-1).\varphi-\hat{\xi}_l)^2$, where $\hat{\xi}_l$ is an estimated value of the total phase difference of the signal received by the antenna of rank l, and $\varphi=2\pi.\cos(\theta).d/\lambda$ where d is a pitch of the array, λ is a wavelength of the signal, and L is a number of antennae in the array.

Claim 22 (Currently Amended): ~~The estimation method according to Claim 15 further comprising:~~

A method of estimating a channel and a direction of arrival (θ) of a signal received by an array of antennae after being propagated along at least one path, comprising, for each path:

a first step of estimating for each antenna (l) in the array of antennae a total phase difference (ξ_l) from a signal (x_l) received by each antenna (l);

a second step of estimating the angle of arrival (θ) of the signal, as well as a phase rotation (ν) undergone by the signal along the at least one path, using each of the antennae total phase differences determined in the first step;

a third step of estimating a new value ($\tilde{\xi}_l$) of the total phase difference for each antenna l in the array, by using the estimated values of the phase rotation ($\hat{\nu}$) and the angle arrival ($\hat{\theta}$) ; and

a fourth step of estimating an attenuation (α) undergone by the signal along the at least one path from estimated values ($\hat{\nu}, \hat{\theta}$) of the phase rotation (ν) and the angle of arrival (θ).

Claim 23 (Currently Amended): The estimation method according to Claim 22, wherein the ~~third~~ fourth step comprises minimizing a distance between a plurality of values of the signal (x_l) taken at a plurality of times (t) and values of a phase-shifted pilot signal (b) taken at said plurality of times (t).

Claim 24 (Canceled)

Claim 25 (Currently Amended): ~~The signal reception device according to Claim 24, comprising:~~

A signal reception device comprising an array of antennae and a corresponding plurality of estimation means each of said plurality of estimation means adapted to implement the steps recited in one of the preceding claims, each of said plurality of estimation means comprising:

means for estimating for each antenna (l) in the array of antennae a total phase difference (ξ_l) from a signal (x_l) received by each antenna (l);

means for estimating the angle of arrival (θ) of the signal, as well as a phase rotation (ν) undergone by the signal along the at least one path, using each of the antennae total phase differences determined in the first step;

means for estimating an attenuation (α) undergone by the signal along the at least one path from estimated values $(\hat{\nu}, \hat{\theta})$ of the phase rotation (ν) and the angle of arrival (θ), and

at the output of each antenna, a plurality of filters, each adapted to different signal propagation paths; wherein

each of said plurality of estimation means is associated with a path (i) and is configured to receive an output of a corresponding filter.

Claim 26 (Previously Presented): The signal reception device according to Claim 25, comprising:

a plurality of beam formation means, each beam formation means being associated with a path (i) and configured to receive from a corresponding estimation means associated with the said path, an estimate $\hat{\theta}_i$ of an angle of arrival of the said path.

Claim 27 (Previously Presented): The signal reception device according to Claim 26, wherein each beam formation means is also configured to receive from an estimation means other than the corresponding estimation means an estimate $(\hat{\theta}_i, i' \neq i)$ of an angle of arrival of another path.

Claim 28 (Previously Presented): The signal reception device according to Claim 26, comprising a plurality of complex multiplication means, each complex multiplication means being associated with a path (i) and configured to multiply an output of a corresponding beam formation means by a complex coefficient $\alpha_i e^{-j v_i}$, where $\hat{v}_i$ and $\hat{\alpha}_i$ are estimated values of a phase rotation and of an attenuation coefficient, respectively, supplied by the corresponding estimation means.

Claim 29 (Canceled):

Claim 30 (Currently Amended): ~~The signal reception device according to Claim 29, comprising:~~

<u>A signal reception device comprising an array of antennae and a corresponding plurality of estimators -each of said plurality of estimators adapted to implement the steps recited in one of the preceding claims, each of said plurality of estimators comprising:</u>

<u>an estimator configured to estimate for each antenna (*l*) in the array of antennae a total phase difference (ξ_l) from a signal (x_l) received by each antenna (*l*);</u>

<u>an estimator configured to estimate the angle of arrival (θ) of the signal, as well as a phase rotation (v) undergone by the signal along the at least one path, using each of the antennae total phase differences determined in the first step;</u>

means for estimating an attenuation (α) undergone by the signal along the at least one path from estimated values $(\hat{\nu}, \hat{\theta})$ of the phase rotation (ν) and the angle of arrival (θ); and

at the output of each antenna, a plurality of filters, each adapted to different signal propagation paths,

wherein each of said plurality of estimators is associated with a path (i) and is configured to receive an output of a corresponding filter.

Claim 31 (Previously Presented): The signal reception device according to Claim 30, comprising:

a plurality of beam formers, each beam former being associated with a path (i) and configured to receive from a corresponding estimator associated with the said path, an estimate $\hat{\theta}_i$ of an angle of arrival of the said path.

Claim 32 (Previously Presented): The signal reception device according to Claim 31, wherein each beam former is also configured to receive from an estimator other than the corresponding estimator an estimate $(\hat{\theta}_i, i' \neq i)$ of an angle of arrival of another path.

Claim 33 (Previously Presented): The signal reception device according to Claim 31, comprising a plurality of complex multipliers, each complex multiplier being associated with a path (i) and configured to multiply an output of a corresponding beam former by a complex coefficient $\alpha_i e^{-j\nu_i}$, where $\hat{\nu}_i$ and $\hat{\alpha}_i$ are estimated values of a phase rotation and of an attenuation coefficient, respectively, supplied by the corresponding estimator.